



ABSTRACT

More results about metamaterial synthesis and design: Towards the construction of third gradient materials

The problem of synthesis of metamaterials has important applications in biomechanics, in engineering and in applied mechanics.

The traditional separation between the mechanics of structures and that of machines needs to be overcome if one wants to synthesise higher gradient continua: in fact, the micro-architectures to be used for this aim are, at micro level and locally, mechanisms while at macro level, once suitable boundary conditions are imposed, they become structures.

The most important concept, in this respect, regards so-called floppy modes for micro-architectures.

These are modes in which, at micro level, one has vanishing deformation energy albeit the micro-architecture is suitably deformed.

Clearly the synthesis of micro-mechanisms whose shape is a floppy mode is essential in the design and synthesis of higher gradient continua.

We present here some interesting preliminary results which continue the scientific program started with the study of so-called pantographic structures.

One has to remark that the assumed micro-structures are all truss structures or linkages: we conjecture that with this class of elementary sub-architectures one can synthesise every higher gradient material.